Brushless DC Motor and Resolver for Venusian Environment, Phase II

Completed Technology Project (2007 - 2009)

Project Introduction

In response to the need for motors, actuators and sample acquisition system that can operate in the harsh Venusian environment for extended periods of time, on the order of several hours to days, Honeybee Robotics proposes development of high temperature scoop and joint; and continued development of an extreme temperature brushless DC motor and a resolver. All hardware will be demonstrated in simulated Venus surface conditions. During Phase I, a first-generation prototype BLDC motor and resolver were designed, built and tested in Venus-like conditions (460

o

C temperature, mostly CO2 gas environment). The Phase I tests demonstrated the feasibility of the design through verification that the motor and the resolver can operate at 460

o

C for an extended period of time. A further developed and optimized version of this motor and resolver could be used to actuate sample acquisition systems, robotic arms, and other devices outside of an environment-controlled landed platform on the surface of Venus. The motor and resolver's capability to survive for hours (and potentially longer) in that environment is a major benefit to future Venus science missions since it would allow time for communication ground loops to optimize sample target selection and allow for multiple samples to be acquired from the surface. The extreme temperature motor and resolver would therefore revolutionize the exploration of Venus. In Phase II, an extreme temperature resolver and a suite of different size of extreme environment brushless motor will be developed to TRL 6. High temperature scoop and joint will also be developed to TL 6. Aside from Venus exploration, other potential NASA and non-NASA applications for an extreme temperature motor include actuation of fluid pumps, gimbals, robotic joints and manipulation systems, as well as turbine, expendable launch vehicle and furnace tending system components.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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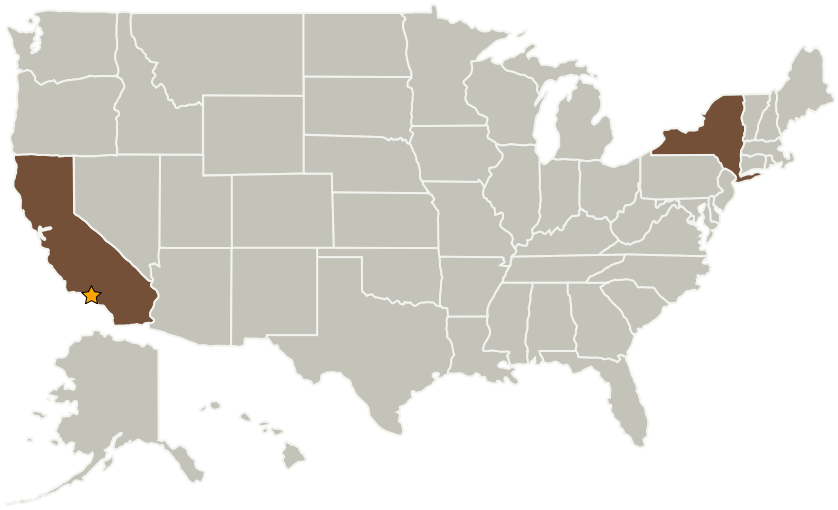
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Honeybee Robotics, Ltd.	Supporting Organization	Industry	Pasadena, California

Primary U.S. Work Locations	
California	New York

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.6 Extreme Environments Related to Critical System Health Management